

Newest Soil Erosion Formula “Goes Commercial”

After nearly a decade of work at more than 10 locations across the country, scientists have completed an erosion-stopping computer program known as RUSLE—Revised Universal Soil Loss Equation.

This program is a more accurate version of one developed in the early 1960's to estimate and help control soil erosion by water.

“Farmers often need advice on what they can do to keep erosion under control on their land,” says hydraulic engineer Kenneth G. Renard. “The new program will show them how they can best reduce erosion with the least expense.”

Renard served as the agency's team leader to revise the program, in cooperation with scientists from USDA's Natural Resources Conservation Service (NRCS). He recently retired from the ARS Southwest Watershed Research Laboratory in Tucson, Arizona.

The new team leader is ARS hydraulic engineer George R. Foster, director of the National Sedimentation Laboratory at Oxford, Mississippi.

RUSLE requires descriptive information on plants and tillage operations that significantly affect erosion. This includes coverage of the soil by plant canopy, height that waterdrops fall from the canopy, amount of roots in the upper 4 inches of soil, surface roughness, amount of residue on soil surface, and depth that residue is buried by a tillage operation.

Besides incorporating advances in computer technology, RUSLE has been improved with new rainfall/runoff erosivity values for the western United States and new ways to calculate factors such as prior land use and slope length and steepness.

One of the major advantages of the new program is that it is now possible to calculate soil loss for vegetables and alternative crops where experi-

mental data are not available. It can quickly evaluate a wide range of untested cropping systems.

A set of baseline values was created by ARS scientists and NRCS technical specialists. These serve as a guide for estimating values for crops and tillage operations not represented in the baseline data.

ARS scientists also came up with procedures for varying these data as yield and tillage operation change from the typical conditions represented by the core data. RUSLE was validated against both the original Universal Soil Loss Equation data and extensive new data on conservation tillage that were not available when the original program was developed.

Says Renard, “For the last 4 years, ARS scientists, in cooperation with the Soil and Water Conservation Society, have helped train employees of the NRCS and the U.S. Department of the Interior's Bureau of Land Management so they could put RUSLE to practical use helping farmers, ranchers, and others.”

RUSLE is already in use by NRCS and other agencies as a tool to identify sites with excessive soil erosion caused by rainfall and surface water runoff, according to Foster. It can help farmers tailor conservation systems to specific sites.

One important use of the new program will be to develop conservation compliance plans to reduce soil erosion on over 36 million acres that farmers will return to cultivation

when their Conservation Reserve Program contracts end.

RUSLE can also be used to plan rangeland resource conservation, as well as for resource inventory work.

“The original program was a powerful tool used by soil conservationists for over three decades,” says Foster. “It's helped farmers keep valuable topsoil on their farms.

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The Revised Universal Soil Loss Equation can be used to calculate erosion potential on a wide range of croplands. (K4250-8)

“Managers have used it to determine regional and national costs associated with erosion. It has also helped them to develop and implement public policy aimed at protecting the environment. And,” he adds, “the new version will do even more.”

The RUSLE program, user's guide, and documentation are available for \$295 from the Soil and Water Conservation Society [7515 Northeast Ankeny Rd., Ankeny, IA 50021-9764] as part of an ARS Cooperative Research and Development Agreement with the society.—By **Dennis Senft and Hank Becker**, ARS.

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